**Fiscal Year Project First Funded**: *FY11*

The project was first funded in FY 11 with funds from both R5 I&M and NRPC WRIA funds. A contract was established with Atkins North American to assist the Region 5 hydrologist to complete WRIAs for 8 refuges in the Northeast. The contractor is primarily responsible for collecting data, generating maps, and preparing a first draft of the WRIA report. The regional hydrologist is responsible for finalizing the report, providing recommendations, and coordinating completion of the WRIA with refuge staff. The original contract has been modified to add additional funds in FY12, FY13, and FY14 and extend the period of performance to FY 17.

**Project Name:** *Water Resource Inventory and Assessments in Region 5*

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**Project Location**: Under this contract WRIAs will be completed for the following refuges:

Bombay Hook
Montezuma
Canaan Valley
Great Meadows
Parker River
Chincoteague
Umbagog
Silvio Conte
Rachel Carson

**Project Goal**

WRIAs evaluate baseline water resource information, including geospatial data, water rights information, a summary of available water quality and quantity data, a description of water management on refuge land, known threats to water supplies (including climate change impacts) and other water resource issues for each refuge. These data are evaluated and used to identify refuge-specific water resource issues and make recommendations for addressing those issues. The goal of the WRIAs is to help refuges make more informed decisions about management operations and assist Regional and national planning and prioritization efforts addressing water issues.

**Expected Conservation Outcome of the Project**:

WRIAs reports serve as a resource for refuge staff by compiling a variety of hydrologic information on the refuge in one place. Additionally, they provide recommendations to refuge staff on how to address threats to refuge water resources. At the regional level, WRIAs provide

perspective on the types of water resource threats facing refuges throughout the region. This information is used to prioritize regional I&M water monitoring activities and support refuges efforts to address particular water resource problems.

**Project Measureable Objectives (Year 1):**

The goal of the project is to complete at least 2 WRIA reports each fiscal year.

**Project Measureable Objectives (Long -term):**

The long-term objective is to complete 9 WRIA reports outlined in the original contract agreement with Atkins North America.

**Assessment of <u>Short-term</u> Performance (FY 14):**

- *90% or more conservation objective achieved*

**Assessment of <u>Long-term</u> Performance this year:**

- *Less than 70% conservation objective achieved*

**Project Status:**

To date, WRIA assessment reports have been completed for 3 refuges under this contract: Bombay Hook, Canaan Valley, and Montezuma. Draft reports for 2 refuges are being reviewed: Great Meadows and Parker River. WRIAs have been initiated at an additional 2 refuges: Chincoteague and Lake Umbagog. The remaining 2 refuges, Rachel Carson and Silvio Conte, will be initiated in FY15.

WRIAs are intended to be a reconnaissance-level review of water resources at a particular refuge. WRIA reports are typically about 50 pages and rely on information from 30 – 60 reference documents. Each WRIA includes the following information:

Physiographic Setting

General description of the refuge's location on the landscape.

Definition of the Region of Hydrologic Influence (RHI)

Essentially the refuge's watershed. The contributing area of the surface water features flowing into the refuge.

Description of geology and geomorphology of the refuge

Recent geologic history and description of major rock types and sediment deposits in the refuge.

Description of refuge soils and their hydrologic properties

Description of soil types in the refuge with particular emphasis on their drainage properties.

Summary of land use activities in the refuge RHI

Using available land-use data summarize the percentage of the RHI that is developed, forested, agricultural land, wetland, etc.

Climatic Setting

Review existing precipitation records to characterize distribution of precipitation and snowfall at the refuge.

Review historic precipitation and temperature records to evaluate long-term (multi-decade) trends.

Streamflow

Review existing streamflow data to evaluate annual runoff patterns in streams near the refuge and long-term trends in stream runoff.

Inventory Water Resources

Inventory refuge water resources. These include the rivers, streams, lakes, ponds, springs, wetlands, wetland impoundments, and groundwater aquifers. These resources can be inside and outside of the refuge boundary.

Inventory Water-Related Infrastructure

Inventory infrastructure, both on and off the refuge that is used to manage water. Examples include water control structures, wetland impoundments, drainage ditches, dams, water supply wells, surface water diversion, ditches, etc.

Water Quality Monitoring

Review available literature and EPA data on the quality of water resources on the refuge.

Identify impaired waters and NPDES permitted discharges on and near the refuge.

Identify and review existing water quality monitoring being conducted by the refuge, other federal agencies, state agencies, and NGOs.

Water Quantity Monitoring

Identify and review existing water quantity monitoring being conducted the refuge, other federal agencies, state agencies, and NGOs.

Climate Trends

Review available literature discussing how the climate is predicted to change in response to warming global temperatures. Discuss implications for refuge water resources. At coastal refuges, review available information on sea level rise and discuss implications for refuge habitat.

Water Rights

Review the water laws of the state where the refuge is located. Identify existing water use permits held by the refuge and determine if new permits are required to meet refuge objectives.

**Final Report Summary (when applicable):**

Final WRIA reports and GIS data files have been provided to the following refuges: Bombay Hook, Montezuma, and Canaan Valley. The Bombay Hook report has been uploaded to ServCat (https://ecos.fws.gov/ServCat/Reference/Profile/24828) and the other reports and GIS data will be uploaded to ServCat shortly.

Some general findings from the completed and draft WRIA reports include:

Water Supply

In general there is ample water in the Northeast to support wetland and aquatic habitat. However, periodic short-term droughts during the summer months are common in the Northeast. The impacts of these droughts on wetland and aquatic habitat can be exacerbated in areas where municipalities and industry rely on groundwater for their water supplies. WRIAs have found groundwater pumping can negatively affect wetland and stream habitat on and near refuges in western Massachusetts (Great Meadows, Parker River) and in the Atlantic Coastal Plain (Bombay Hook, Cape May).

Water Quality

The high density of urban and suburban development in the Northeast causes water quality impairments in refuge water resources. Excess nutrients due to stormwater runoff, waste water treatment facilities, and failing septic tanks are the most common water quality issue in refuge waters. Additionally, there are

numerous contaminants that have been released into refuge waters from the long history of industrial development in the Northeast.

On and Off Refuge Infrastructure

The long history land use in the Northeast has left features like dams, dikes, drainage ditches, mosquito control ditches, water diversions, and roads on the landscape. Many of these features change natural flow patterns and limit refuges' ability to meet habitat management objectives. Refuges are working to improve habitat by removing this infrastructure or making engineering upgrades to minimize the hydrologic impact of this infrastructure.

Water Monitoring

Many organizations are monitoring water quantity and water quality in water resources near refuges. Most efforts appear to be focused on monitoring water quality and are being carried out by federal agencies, state agencies, universities, and NGOs. Although these efforts are generating a wealth of data, in most cases, they are not well coordinated between agencies and typically do not directly address refuge concerns.

Climate Change

Predictions for the Northeast are increasing frequency of intense precipitation events, decreasing snowfall totals, and increasing frequency of short-term droughts (1-3 months). These are expected to cause more frequent extreme runoff events and increase the duration of low flow conditions in Northeast streams.

Rates of sea level rise in Region 5 are some of the highest in the United States and nearly double the global average. Refuges in R5 are working hard to evaluate the impacts of sea level rise on refuge habitat and develop strategies for adapting to rising sea levels.

Water Rights

The majority of states in Region 5 have regulations that require permits for using surface water and groundwater. These permitting requirements only apply on refuges where surface water or groundwater is actively diverted to flood impoundments or meet other refuge objectives. In the majority of cases, Northeast refuges do not divert surface water or groundwater and do not need water use permits to meet refuge objectives. Water use disputes in the Northeast are typically resolved on a case by case basis; either in the courts or through administrative hearings with state regulatory agencies.